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10/533,172	04/29/2005	Jolinde Machteld Van De Graaf	TS1320 US	9201

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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/533,172
Filing Date: April 29, 2005
Appellant(s): VAN DE GRAAF ET AL.

Charles W. Steward
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 7, 2008 appealing from the Office action mailed October 26, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6074459	Gingrich et al	6-2000
4329160	Sherman et al.	5-1982
3620969	Turnock et al.	11-1971

GB 2275625 A Taylor, Nigel Anthony, 09-1994

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 5-7, 14, 16, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2275625 A in view of Gingrich et al. (6,074,459). GB '625 teaches a process for removing hydrogen sulfide and organic sulfur compounds from a natural gas comprising contacting the gas with sulfolane in an absorber, contacting absorber effluent gas with a type 5A or 13X zeolite (pore diameter of at least 5 angstroms), then regenerating the zeolite with heated product gas from a second adsorber in the presence of water that can also be adsorbed on the zeolite (figure, page 1, lines 9-15, page 2, lines 5-31, page 3, lines 10-18, page 4, lines 12-18). The instant claims differ from the disclosure of GB '625 in that water in the feed stream is removed on a first zeolite having a pore diameter of less than 5 angstroms and that a preferred temperature, pressure and gas velocity are used. Gingrich et al. '459 discloses a process for removing contaminants from a natural gas comprising flowing the gas through a first adsorbent bed including a zeolite 3A or 4A for adsorbing water and a second bed including a zeolite for adsorbing sulfur compounds (see col. 3, lines 4-46). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the adsorbent beds of GB '625 by using an upstream bed of zeolite 3A or 4A in order to optimize the capacity of subsequent beds. Absent a proper showing of criticality or unexpected results, the temperature, pressure and flow rate are considered to be parameters that would have been routinely optimized by one having ordinary skill in the art based on the adsorption characteristics and application size.

Claims 1, 7, 8, 10-12, 14, 16, 20, 21 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sherman et al. (4,329,160) in view of Gingrich et al. '459 and taken together with Turnock et al. (3,620,969). Sherman et al. '160 teach a process for removing hydrogen sulfide and mercaptans from a natural gas stream, comprising contacting the stream including up to 5 mole % H_2S with a zeolite having a pore diameter of at least 5 angstroms at a temperature of 60-120° F and a pressure of 200-1200 psi, then regenerating the zeolite with a portion of a hydrocarbon product stream having an appropriate amount of water vapor added, such as 0.185 mole % (see figure, col. 1, lines 1-68, example 1). The instant claims differ from the disclosure of Sherman et al. '160 in that the zeolite contains a binder, there is an additional bed of zeolite having a pore diameter of less than 5 angstroms, and that a preferred temperature, pressure and gas velocity are used. Gingrich et al. '459 disclose a natural gas purification method as described above. Turnock et al. '969 teach a process for removing sulfur compounds from a liquid natural gas stream, comprising contacting the stream with a zeolite having a pore diameter of greater than 5 angstroms at a linear velocity of 0.1-20 feet per minute, then regenerating the zeolite with an inert gas containing moisture to a dew point level of 10-160°F and heated to 500-700°F (see col. 2, line 37 to col. 3, line 60, col. 4, lines 27-75, col. 5, lines 46-65). The sulfur compounds can include up to 2 weight % hydrogen sulfide or organic sulfides such as mercaptans, disulfides, thiophene and carbonyl sulfide, and the zeolite can include a binder. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the adsorbent bed of Sherman et al. '160 by using an upstream bed of zeolite 3A or 4A in order to optimize the capacity of subsequent beds. Absent a proper showing of criticality or unexpected results, the temperature, pressure and flow rate are considered to be

parameters that would have been routinely optimized by one having ordinary skill in the art based on the adsorption characteristics and application size. It would have also been obvious to use a zeolite with a binder in order to provide a sorbent that retains its selectivity and capacity.

(10) Response to Argument

With respect to the rejection over GB '625 in view of Gingrich et al, applicant argues that the instant claims require that the regeneration gas contains a certain amount of water expressed in terms of relative humidity, and that the prior references disclose convention "dry" regeneration with no specified relative humidity. The examiner agrees with this argument and appreciates the inventive concept of "wet" regeneration expressed in the instant disclosure, however the rejected claims do not recite a level of humidity or presence of water vapor in the regeneration gas that distinguishes over the prior art. Claim 1 recites regeneration "in the presence of water" and a regeneration gas with a relative humidity of "at most 30%," which is interpreted to include a relative humidity of 0%. Claim 7 recites a relative humidity of "less than 100%," and claim 14 recites "at most 30%," which both also include 0%. Independent claim 20 is not rejected over GB '625 because the claim recites a humidity of at least 0.1% and less than 100%. The claims rejected over GB '625 in view of Gingrich et al do not require wet regeneration. Regarding the phrase "in the presence of water" in claim 1, dry regeneration in GB '625 takes place in the presence of water sorbed on the zeolite (see page 4, lines 12-18).

With respect to the rejection over Sherman et al in view of Gingrich et al and taken together with Turnock et al, applicant argues that there is no teaching or suggestion in Sherman et al of removing water using a zeolite having a pore diameter less than 5 Angstroms prior to contacting it with the molecular sieve having a pore diameter of at least 5 Angstroms to remove

sulfur compounds. The examiner agrees with the argument however the secondary reference to Gingrich et al has been cited to address this limitation and disclose a motivation for using the upstream water removal bed.

Applicant also argues that the Sherman et al and Turnock et al references fail to disclose using a regeneration gas having a specified relative humidity for the purpose of substantially reducing the degradation/ageing of the adsorbent over repeated cycles. The examiner also agrees with this argument, however reducing degradation and ageing of the adsorbent is not claimed. Sherman et al discloses a different reason for using a wet regeneration gas (to suppress COS formation) and its combination with Gingrich et al and Turnock et al still meets the claim limitations. The secondary references are cited to show a motivation for using an upstream water adsorbent and a zeolite with a binder.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Frank M. Lawrence/

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